THE INSURANCE CLIMATE FOR SMALL SATELLITES AND ELVs: 1990

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The space insurance industry provides coverage for physical damage and liability risks to which space ventures are exposed as part of their business. The Insured party obtains insurance coverage through a Broker, who represents the Insured in soliciting coverage from the various Insurers in the world market. Physical damage insurance is designed to cover the value of an asset or the revenue it may provide, while liability insurance covers damage to the person or property of parties unrelated to those involved in launch activities. To date, five commercial launches of small ELVs have been conducted, and the necessary insurance has proven to be available at affordable rates. The forecast growth in the market for small spacecraft should prove attractive for insurers, and coverages should continue to be readily available for some time.

OVERVIEW OF THE SPACE INSURANCE INDUSTRY

The space insurance industry provides insurance coverage for risks which space ventures are unable to reduce or eliminate by other means. In the context of providing insurance coverage, there are four primary players: the Insured, the Broker, the Insurer (Underwriter is often used synonymously), and the Reinsurer.

The Insured is the party whose risk is being protected by the insurance. Typically the Insured would be the owner of the payload to be launched, or the provider of the launch vehicle who is insuring the cost of providing a new launch if the first one fails. The Broker is a professional insurance agent who is retained by the Insured to obtain coverage for the risk against which the Insured wishes to be protected. The Broker does so by soliciting the desired coverage from the various space Insurers in the world market who cumulatively insure the risk. Each Insurer has a certain amount of capacity (the total amount of insurance for a single risk) which can be made available for acceptable insurance coverages. The Insurer reviews each risk which is presented and determines the premium rate and conditions under which he is willing to provide some or all of his capacity. The actual funds which the Insurer puts at risk under a given coverage are both his own and those of his Reinsurers, the sum of which constitute that Insurer's total capacity. The premium collected is paid to the various Insurers in their respective share of participation by way of the Broker, and if there is a loss, each Insurer pays his share to the Insured. The total capacity of the world space insurance market is about $250 million.

The Insurer's main concern is to understand the risk he is insuring, particularly the technical aspects thereof, and is thus

inclined to require a significant amount of technical information as a condition of providing coverage. In the long run it may actually be to the benefit of the Insured to have an Insurer who takes an interest in the technical details of the risk, because through discussions and observations associated with a knowledgeable Insurer, improvements for the overall risk management plan may be identified. Ideally the relationship between Insured, Broker, and Insurer is one in which risk management skills are applied to help the Insured minimize overall risk.

AVAILABLE SPACE INSURANCE COVERAGES

The types of risks which can be covered by space insurance fall into two broad categories: physical damage and liability. Physical damage insurance is designed to cover the risk of losing physical assets, generally for the cost of replacing them. In a launch coverage, the owner of a spacecraft would insure the value of the spacecraft and the cost of the launch, beginning typically at intentional ignition of the launch vehicle and ending at separation of the spacecraft. Often he will also insure the initial operation of the spacecraft after it separates from the launch vehicle until it has completed its test phase and is declared operational. Collectively these coverages are known as "launch and initial operations."

Once a spacecraft has completed its initial operations period, the owner may wish to insure its continued successful operation. He may elect to insure the book value (depreciated) of the spacecraft, replacement cost, or the value of the revenues generated for a given period. These coverages are called "on-orbit life."

In today's market, launch and initial operations coverages for large communications satellites cost between 17 and 20 percent of the sum insured, with a typical value of $75-200 million. On-orbit life coverage premium rates typically range between 1.5 and 4 percent on insured sums of $25-200 million. Both of these types of coverages have now been provided for small launch vehicles and spacecraft.

Liability insurance is intended to cover the risk of damaging the person or property of parties who are not part of the organization(s) purchasing or conducting the launch. In the U.S., in order to secure a license from the Department of Transportation (DOT) to launch, the launch operator must secure liability coverage for damage to the person and/or property of third parties and to government property.

Third party liability insurance is designed to cover the Insured against the possibility that bodily injury or damage to property will occur to some person unrelated to the launch (the "man in the street"). If such injury or damage does occur, then

the insurance responds on behalf of the insured ELV operator and his customers, contractors, and subcontractors to settle the claim.

U.S. ELV operators must carry liability insurance in the amounts specified by DOT. Thus far the required sums for small ELVs have ranged from $10-12 million for third party liability, and $1-2.5 million for government property damage.

To underwrite either physical damage or liability coverages, the criteria are fairly similar. The Insured will typically be asked to provide details of the launch vehicle and its payload(s), the performance track record of the vehicle(s) or system(s) from which the vehicle(s) has been developed, the nature and scope of the government facilities to be used, copies of the contracts and agreements with customers, major suppliers, and the government, and copies of their DOT license and insurance orders.

RECENT DEVELOPMENTS

Historically, the primary focus of the space insurance market has been the launch of large communications satellites on expendable launch vehicles, and financially these coverages will probably continue to dominate the market for some time. However, beginning last year, commercial small satellites and launch vehicles have emerged as a new segment of the market requiring coverages similar to those provide for large satellites.

Since the rash of spacecraft and ELV failures in the mid-1980s, the worldwide space insurance market has slowly recovered from the extreme financial losses it suffered in that period (Figure 1). Market capacity for launch risks, which plunged below $100 million in 1986, has risen to around $250 million for good risks (Figure 2).

As of early 1990, premium rates for launch and initial operations coverages for large spacecraft had been declining since the last major failure (GStar III in September, 1988) to just over 17 percent of the sum insured. The back-to-back failures of Ariane V-36 in late February and Titan III in mid-March appear to have arrested the decline of rates in the 17-19 percent range. This is roughly in line with the on-going industry failure rates (Figures 3 and 4). (Ariane V-36 carried Superbird B and BS-2X which were insured for roughly $250M, and the Titan carried Intelsat VI F3, which was valued at $265M but was uninsured.)

Since last year's conference, there have been four launches of commercial small launch vehicles. American Rocket's first launch attempt failed on the pad, resulting in a claim against the government property insurance for damage to the pad at Vandenberg. Space Services launched two Starfire rockets for the University of Alabama-Huntsville's CCDS, the first of which failed (and was uninsured for a launch failure), and the second of which was

successful (and was insured). Finally, Orbital Sciences successfully launched its first Pegasus rocket, for which launch insurance had been provided, but the subject payload (Datasat-X/VAStar) had been bumped.

OUTLOOK FOR THE FUTURE

Thus far, none of the operators of small commercial ELVs have had any difficulty in obtaining either the DOT license-required insurance or, when it has been desired, traditional launch risk insurance. Barring a string of major failures in the large ELV/spacecraft market, this situation should continue for some time.

Several factors favor the operators of small ELVs and spacecraft in the insurance market for the future. First, the number of launches is expected to increase, so insurers will see the potential for growth in this new market segment. Second, the necessary amounts to be insured are nearly always small compared to those for large ELVs/spacecraft, thus representing a perceived "smaller" risk for insurers. Third, the high level of interest on the part of new customers in new applications for small spacecraft (as typified by the NASA CCDS reusable re-entry vehicle program (COMET)) also indicates further growth. Fourth, among these new applications are several proposals for multi-satellite systems, which represent attractive targets for coverage as a group (at attractive rates for operators). Fifth, the continued transition of government procurements to a "launch services" basis carries with it a likely increase in the use of reflight guarantees, which are normally supported by launch insurance. Finally, the small ELV market shows signs of "normal" growth, as indicated by the withdrawal of American Rocket from the launch services side of the market, the failure of Space Services Inc.'s financing, and (despite these problems), the entry of a new player, Micro Satellite Launch Systems.

Figure 1
Launch Insurance*
Worldwide Premium and Loss History
(U.S. $ Millions)

Year	Gross Premium	Losses
1968	1.6	0.0
1969	0.0	0.0
1970	0.0	0.0
1971	0.8	0.0
1972	1.4	0.0
1973	0.5	0.0
1974	3.6	0.0
1975	4.4	0.0
1976	8.3	0.0
1977	10.4	29.1
1978	8.0	0.0
1979	13.1	92.0
1980	8.1	0.2
1981	31.9	0.4
1982	55.3	90.5
1983	81.4	5.3
1984	95.5	291.3
1985	141.4	345.0
1986	55.0	82.0
1987	68.8	53.0
1988	146.7	150.0
1989	193.5	6.0
1990**	330.0	190.0
Totals	1,259.7	1,334.8

* Includes initial operations of spacecraft
** 1990 is premium for scheduled launches; losses through 8/1/90

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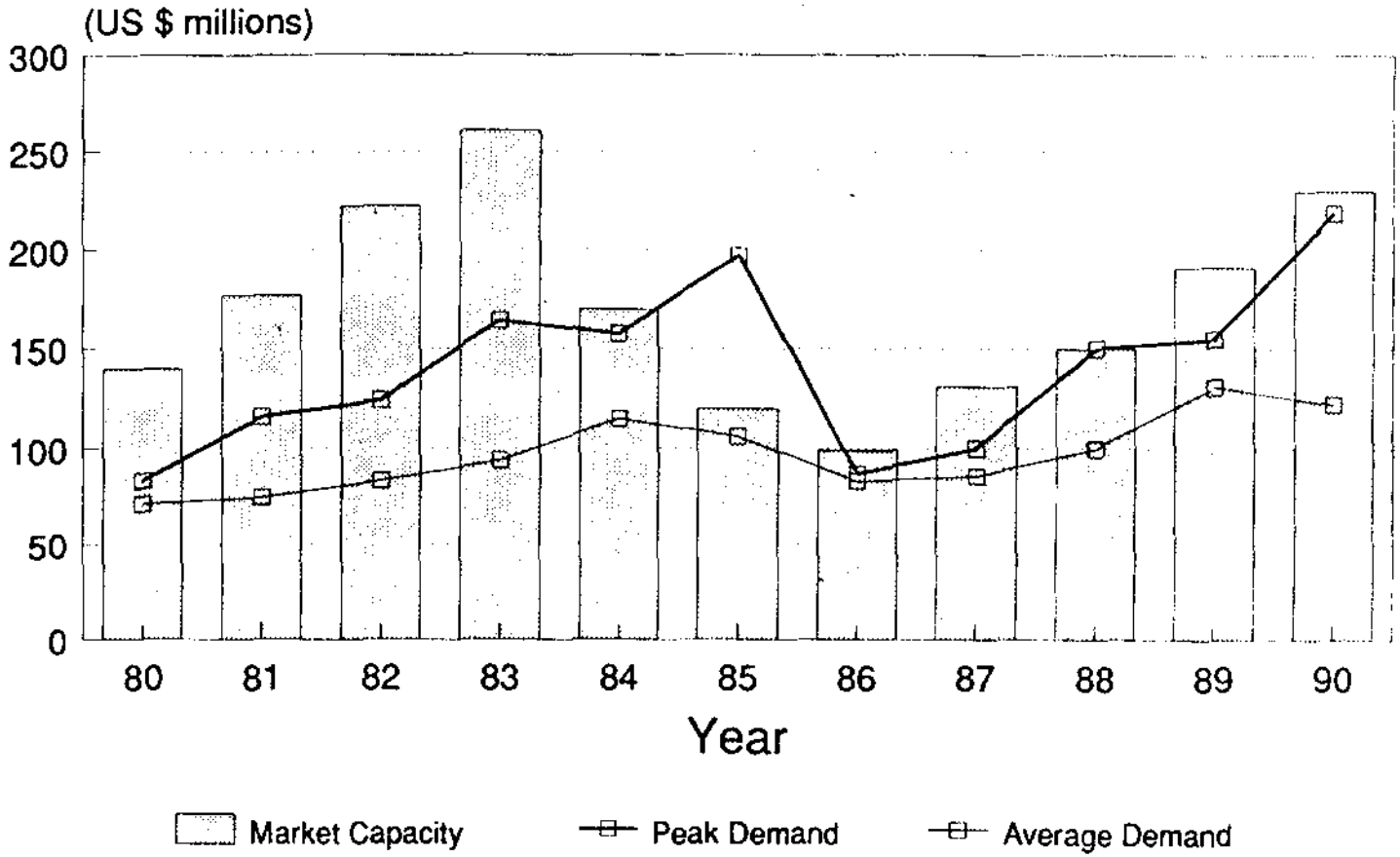
Figure 2

Launch Insurance Market Capacity * versus Demand



* Excludes launch agency guarantees

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Figure 3

Insured Commercial Payload Failure Rates

Year	Number of Insured Payloads	Number of Failures	Cum Failure Rate	Last 10 Years	Last 5 Years
1968	1		0.0%	0.0%	0.0%
1969	3		0.0%	0.0%	0.0%
1970	3		0.0%	0.0%	0.0%
1971	2		0.0%	0.0%	0.0%
1972	3		0.0%	0.0%	0.0%
1973	2		0.0%	0.0%	0.0%
1974	3		0.0%	0.0%	0.0%
1975	5		0.0%	0.0%	0.0%
1976	8		0.0%	0.0%	0.0%
1977	8	1	2.6%	2.6%	3.8%
1978	8		2.2%	2.2%	3.1%
1979	6	2	5.8%	6.3%	8.6%
1980	2		5.6%	6.4%	9.4%
1981	8		4.8%	5.7%	9.4%
1982	13	2	6.7%	7.9%	10.8%
1983	13		5.7%	6.8%	9.5%
1984	17	3	7.6%	9.1%	9.4%
1985	19	4	9.7%	11.8%	12.9%
1986	4	1	10.2%	13.3%	15.2%
1987	4	1	10.6%	13.8%	15.8%
1988	9	2	11.3%	15.8%	20.8%
1989	12	1	11.1%	13.7%	18.8%
1990*	21	3	11.5%	14.2%	16.0%
Total	174	20			

* 1990 figures are forecast launches for full year, failures thru 8/1/90

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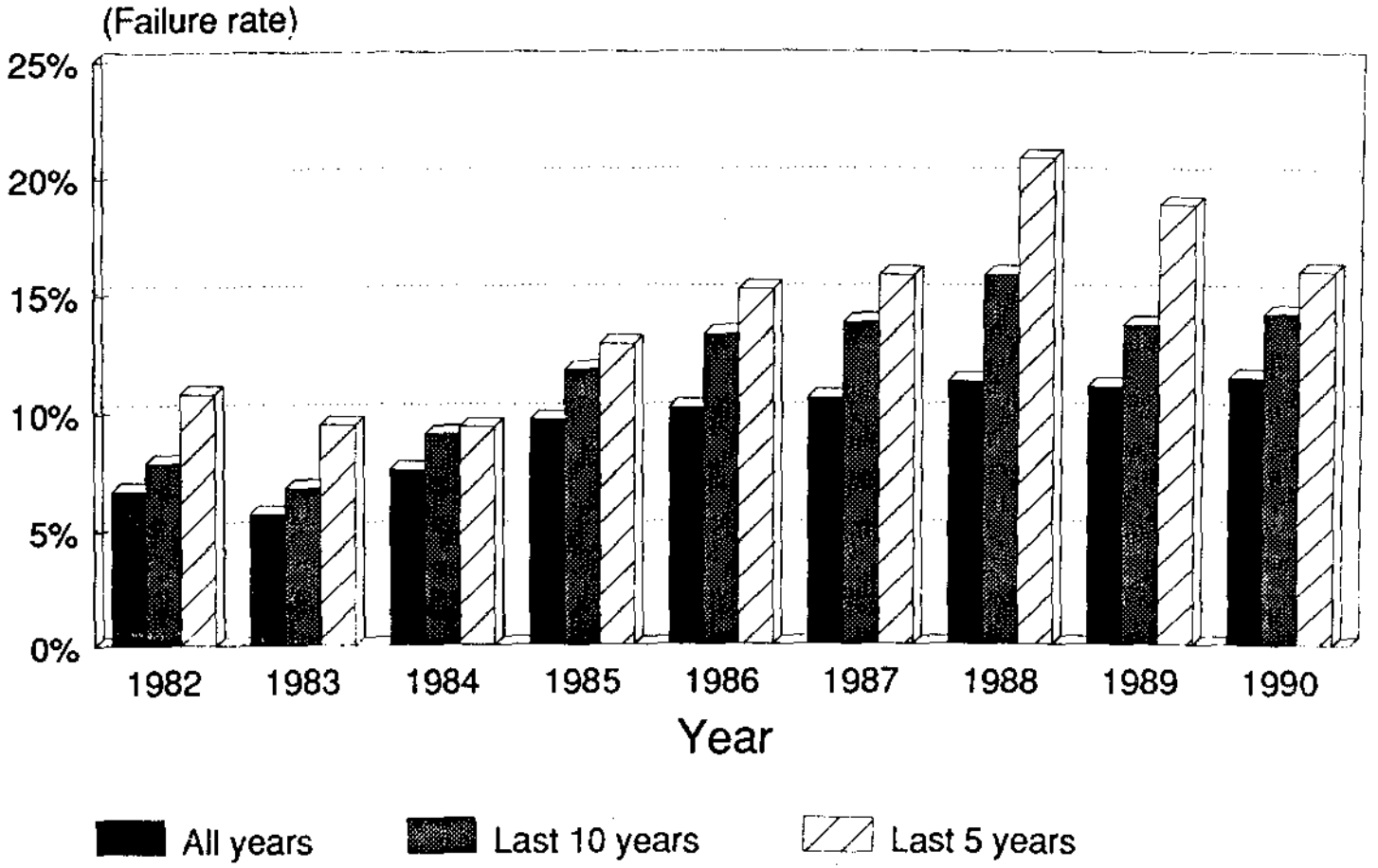
Figure 4

Cumulative Failure Rates

(insured payload launch attempts)



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